THE CAUSE OF INCONTINENCE AS A SEQUEL OF PROSTATECTOMY.[1]

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A FEATURE of prostatectomy which has interested me greatly is the occurrence of incontinence, perhaps because the percentage of such cases has been rather large at Rochester.

One operator has performed twenty prostatectomies with one case of incontinence, another ten with one case, another seven with two cases, and two others one case each, one of these being followed by incontinence. Total, thirty-nine cases with five cases of incontinence, or 13 per cent. One of these cases recovered bladder control after three months and another after over two years, leaving three cases of apparently permanent incontinence, or 7⅔ per cent., a rather high rate.

Francis S. Watson, in his admirable article on prostatectomy, published in the ANNALS OF SURGERY, June, 1904, gives a very complete *résumé* of the results and complications in 530 cases, and states the proportion of incontinence as 3½ per cent., which is probably considerably below the true figure.

This phenomenon has been variously explained. Lilienthal, in commenting upon Gibson's case of incontinence, reported at the New York Surgical Society, April 8, 1903, said that "Incontinence often occurs for weeks and months, when the control has been good immediately after the operation." His theory is that "The scar formed at the neck of the bladder and in the urethra is at first succulent and forms a good valve. Then the cicatrix becomes hardened, causing the formation of a rigid, patent, urethral tube, permitting the urine to enter the deep urethra, and dribbling results. Later on the scar atrophies and again softens, and full control is once more regained."

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[1] Read before the Medical Society of the State of New York, February 1, 1905.

The varying duration of the time required for recovery, ranging from two or three weeks to as many years, seems to me to combat this theory, and other points make it absolutely intenable.

Professor James E. Moore, of Minneapolis, in the ANNALS OF SURGERY, March, 1904, says that "Incontinence after prostatectomy is due to injury to the muscles or the nerves or to the neck of the bladder, most often the latter; that a careless or inexperienced operator may very easily tear away that portion of the sphincter of the bladder just below the urethra and in front of the third lobe, which would be very liable to be followed by incontinence."

George Woolsey, in discussing the three cases of incontinence reported by Parker Syms at the New York Surgical Society, November 13, 1901, said that the occurrence of incontinence may be partly explained by assuming that the fibres of the prostatic urethra were torn and not properly repaired.

If injury to the vesical neck, or prostatic urethra, or both, is the cause of incontinence, how can we intelligently explain the remarkable results of Moynihan, of Leeds, who intentionally removes the entire prostatic urethra, and of Freyer, of London, who has been forced to do the same in several of his cases, yet without the occurrence of incontinence.

In one of the cases operated upon at Rochester, there was a great deal of laceration of the tissues during the operation; the patient did very badly thereafter, being at the point of death for two weeks, and large sloughs, including a great deal of the bladder wall, one piece of mucosa being nearly three inches in diameter, came away, so that the attending physicians estimated that at least one-third or one-half of the bladder sloughed away. Yet this man was never troubled by incontinence.

Now it seems to me that the premises in the above reasoning are entirely incorrect and misleading. The mechanism of urination and the significance of the two-glass test of the urine have apparently been quite forgotten.

We all know, or ought to at least, that the vesical sphincter is a comparatively weak muscle, and that the only muscle, by the action of which we are enabled to resist a strong desire to urinate, is the external sphincter or compressor urethræ, which is a strong, voluntary muscle, surrounding the urethra, in the space between the two layers of the triangular ligament, its anterior margin forming the boundary between the anterior and the posterior urethra.

In health, as soon as three or four ounces of urine have collected in the bladder, the vesical sphincter relaxes and permits the urine to pass down, filling the posterior urethra, until it meets the resistance of the external sphincter. The function of the vesical or internal sphincter is then at an end until after the next act of urination.

Often, restrained by circumstances or by false modesty, men hold their urine until the bladder is so distended that its strong muscular wall is paralyzed, and it becomes impossible to pass the urine at all, or only by dribbles. This vigorous power of resistance is wholly due to the external sphincter.

It is then evident that we must look farther and search deeper for the true cause of incontinence in these cases. Paralysis, partial or complete, of the external sphincter must be present, in order to explain it satisfactorily.

When we seek to ascertain the nerve supply of the external sphincter, we are met at once by contradictions. Gerrish and Morris give its supply as derived from the dorsal nerve of the penis, a branch of the pudic nerve. Gray and Cunningham give as its supply a branch of the deep or muscular division of the perineal nerve, which is derived from the pudic. Von Bardeleben gives its supply as a branch of the superficial division of the same perineal nerve.

According to Dr. George Woolsey, all these nerves are safe in the median incision of Syms and others, the lateral incision of Von Dittel, and also in the inverted V of Young, unless the angle of the V is placed far forward and the arms diverge very greatly, which probably rarely happens.

But, where such difference exist, it is at least conceivable that possibly neither of these authors is correct, and that a branch, whose course is nearer the prostate, is its real supply.

It seems to me that either this theory of a nerve supply of the external sphincter, running close to the prostate, and sometimes injured in the strenuous manipulations attending its removal, must be true, or else the injury must be looked for in the operation on the membranous urethra itself. This is accompanied, nearly always, by great stretching and tearing of the posterior urethra, sufficient to permit the exploration of the bladder with the finger, the passage of instruments and even the extraction of calculi. In these manipulations, especially at the hands of inexperienced or bungling operators, there is certainly great damage done to the external sphincter muscle, and, in addition, its nerve supply may be totally or partially cut off, especially if the incision is not made exactly in the median raphe.

If it be objected to this theory that, in a large proportion of cases, full bladder control is ultimately recovered, it is only necessary to refer to the fact that in many cases where an inch of nerve, or even an entire ganglion, has been resected, in the treatment of obstinate neuralgia, both motion and sensation have returned after a variable length of time.

Also to be considered is the fact that pressure is capable of producing paralysis. For instance, the very trifling pressure on the ulnar nerve produced by sitting in a chair with padded arms will, if long continued, cause, in some persons, an obstinate ulnar paralysis. It is quite conceivable that the rather violent operative procedures in prostatectomy may produce similar effects by extreme pressure for a short time.

Incontinence following simple external urethrotomy, where less cutting, dilatation, and laceration are practised, is, in my personal experience and reading, very rare.

My suggestions would therefore be that, if perineal prostatectomy is performed, the incision into the urethra should be made as close to the prostate as possible, exactly in the median raphe of the compressor urethræ, and the utmost care be exercised to avoid stretching and laceration of the muscles.

But, judging from the statistics of Freyer and Moynihan, if one wishes to assure himself against the occurrence of incontinence, the suprapubic should be the operation of choice, unless decided contraindications exist, and, according to Freyer, there are no contraindications, if the patient is in a fit condition to undergo an operation of any gravity whatever. I have carefully read over the histories of his first 105 suprapubic operations, ending October 29, 1904, and following every case which survived is one of these two remarks, " Patient is able to retain and pass his urine naturally," or, " Untroubled by any urinary symptom."

It appears, however, to be a grave and needless interference to remove the prostatic urethra, according to Moynihan's method, unless absolutely unavoidable. Nature is capable of rectifying many defects in operative procedures, but it is certainly better surgery to leave intact the normal epithelial covering of the urethra, rather than to substitute one built up by granulation tissue, thus increasing the danger of sepsis and the liability to subsequent contraction.

I will advance another theory, according to which this, as a rule, temporary symptom might be accounted for, although I do not believe it to be the true one. It is certainly a wise provision of Nature that so important an outlet as the urethra should be put under the control of two, separate muscles, and that their action is so regulated that each of them does duty, alternately, for approximately half of the time. These periods of rest may be necessary to the perfect performance of their function. If so, it is readily comprehensible that the destruction or paralysis of the internal sphincter may produce incontinence, through paralysis of the external sphincter, caused by the lack of its normal periods of relaxation.

For this theory would speak the facts that this incontinence is rare during sleep, that it becomes worse towards evening, and above all that the muscle almost always finally performs its function perfectly, generally in a few months, in the same manner as other organs which develop to meet additional work when thrust upon them.

Against it would be the very strong and probably decisive argument that in Freyer's and Moynihan's cases, where the whole prostatic urethra has been removed, not even temporary incontinence occurred.

The following statements in one of Freyer's articles certainly go far to prove the correctness of my theory. In describing the autopsy of a case, which died twenty-two days after operation from acute mania, he says, " The suprapubic wound had practically closed. There was nothing abnormal about the bladder, except that it was pear- or funnel-shaped instead of globular, the inner orifice of the urethra terminating at the triangular ligament. It would thus appear that, after complete enucleation of the prostate, the prostatic urethra, deprived of its normal support, widens out in funnel fashion and practically becomes part of the bladder cavity. *It further demonstrates definitely that the true sphincter of the urethra (or bladder) is situated at the membranous portion of the urethra.*" (Not italicized in the original.)

On February 4, three days after the reading of this paper, there appeared in the *New York Medical Record* an article by Dr. E. G. Ballenger, of Atlanta, Georgia, in which, among his " Conclusions," he states, " In the perineal operations carefully cut the central tendon of the perineum close to the rectum, but with the finger in it to avoid injury. Avoid laceration of membranous urethra, as incontinence of urine will follow." So far as I know, this is the only other published recognition of the fact that incontinence, after prostatectomy, is due to interference with the external sphincter muscle.

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